HELI-LOG DROP ZONES

Prepared for:
Economic Development Branch
BC Ministry of Sustainable Resource Management

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BUILDING BLOCKS FOR ECONOMIC DEVELOPMENT & ANALYSIS

PREFACE

PURPOSE

Building Blocks have been conceived and developed by the Economic Development Branch of the Ministry of Sustainable Resource Management, under the guidance of Nancy South, Manager Economic Analysis, as an analytical tool that supports British Columbia coastal and land and resource use planning and decision-making and economic development initiatives. The Blocks contain concise business and sector information for a broad range of resource-based business types in BC. At this point, there are more than 30 Blocks either complete or in draft form. Several more Blocks have been identified as high priority by planning tables and other client groups. Additional Building Blocks will be developed over time, and some Blocks may be updated. For the most current Building Blocks, please see the Ministry of Sustainable Resource Management website, at: http://srmwww.gov.bc.ca/rmd/ecdev/

ACKNOWLEDGEMENTS

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BENEFITS

Building Blocks are expected to provide the following general benefits:

- Increase efficiency and more informed decision-making by providing readily accessible, credible information to planning and economic development processes;
- Improve the consistency of economic information across planning areas;
- Support economic analysis and decision-making that occurs outside formal coastal and land use planning processes; and
- Provide linkages between economic analysis and other social and environmental analytical tools (through identifying resource requirements to support economic activities and general compatibilities with other sectors and values).

LIMITATIONS

Every effort has been made to ensure that the information contained in Building Blocks is accurate and consistent. Approved, credible data sources are the foundation for Building Blocks. All Blocks were reviewed by sponsoring agencies and other experts. However, users are cautioned that information is used at their own risk, and that the authors and sponsors are not liable for any damages. Any conclusions or interpretations by the authors are not intended to represent government policy. Also, note that Building Blocks do not provide site specific information nor do they consider requirements for sustainability (social, community, environmental).

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RECOMMENDED REFERENCE/CITATION

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TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE OF THIS STUDY 1

2.0 AN ECONOMIC PROFILE – HELI-LOG DROP ZONES 1

2.1 Overview –Geographic Description 1
2.2 Heli-log Drop Zones 2

3.0 HELI-LOG – WATER-DROP REGION: COAST & INTERIOR 2

3.1 Geographic Range 2
3.2 Resource Requirements 2
3.3 Products 3
3.4 Investment 3
3.5 Infrastructure 3
3.6 Market Outlets 3
3.7 Resource Capacity 3
3.8 Labour Markets Employment 3
3.9 Government Revenues 3
3.10 Regulatory Regime(s) 4
3.11 Coefficient Area of Crown land 4

4.0 LAND DROP 4

5.0 HELI-LOG – LAND-DROP REGION: COAST & INTERIOR 5

5.1 Geographic Range 5
5.2 Resource Requirements 5
5.3 Products 5
5.4 Investment 5
5.5 Infrastructure 5
5.6 Market Outlets 5
5.7 Capacity 6
5.8 Labour Markets Employment 6
5.9 Government Revenue 6
5.10 Regulatory Regime(s) 6
5.11 Coefficient Area of Crown Land 6

6.0 GOVERNMENT REVENUES 7

6.1 Rental Fees 7

7.0 INPUT / OUTPUT ESTIMATES FOR HELI-LOG DROP ZONES 7

7.1 Heli-log Drop Zones – Input / Output Estimate 8
7.2 Input / Output Coefficients 9
7.3 Regulatory Requirements 9

ATTACHMENTS

1. Crown Land, Land Use Management Manual, Volume 3, Chapter 3.3
2. Excerpts of Applicable Regulations

1.0 PURPOSE AND SCOPE OF THIS STUDY

The Ministry of Sustainable Resource Management, Economic Development Branch, has identified an analytical tool, described as a "building block" which is intended to support land use decision-making by way of providing an accurate description of the economic outcomes of various building blocks (commercial activities).

This study estimates the investment of resources and economic outcomes associated with a forest-sector building block, **helicopter (heli-log) logging water and land drop zones.**

Limited economic data describing this specific building block was available through the Ministry of Forests, or other provincial government agencies. The Ministry of Provincial Revenue collects and regularly updates cost data from forest industry operators for the purpose of deriving appraisal estimates for incorporation in the Comparative Value Pricing System – this is the primary mechanism by which the provincial determines stumpage rates. Data within the Ministry of Provincial Revenue is not sufficiently refined as to capture the economic outcomes associated with heli-log drop zones. For this reason the Ministry of Provincial Revenue was unable to provided cost data relevant to the building block of interest. An economic description of heli-log drop zones relied, for the most part, on the participating industry operators.

Industry operators provided data to Sterling Wood Group on a confidential basis and for the purposes of this study only. Sensitivities regarding the use of data by a government agency related primarily to the Comparative Value Pricing System – a separate, long running, formal process between government and industry operators facilitates the exchange of operating cost information.

2.0 AN ECONOMIC PROFILE — HELI-LOG DROP ZONES

The Ministry of Sustainable Resource Management (MSRM) has designed a "Building Block Template" which identifies ten design elements. This section describes the design elements for the building block of interest in accordance with the template identified by the MSMR.

2.1 Overview – Geographic Description

Two forms of heli-log drop zones exist (i) water-based log drop, and (ii) land-based log drop. Water-based heli-log drop is predominantly undertaken on the coast of British Columbia with limited use on inland waterways. The coastal region of British Columbia is divided into three sub-regions:

- South Coast, including Vancouver Island
- Mid-Coast
- North Coast

Water-based log drop occurs throughout each of these sub-regions of the coast.

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The interior of British Columbia is described in the Interior Appraisal Manual as the entire province of British Columbia, excluding the Vancouver Forest Region (as established by the *Forest Act and Regulations*) and that part of Prince Rupert Region west of the Cascade Mountains Administrative Line from Tweedsmuir Park to the State of Alaska. The activities of heli-log land drop and to a limited extent, water drop are undertaken in the interior. Helicopter logging is more common in the East and West Kootenay regions.

2.2 Heli-log Drop Zones

Water Drop

Aerial yarding of logs using a water-drop helicopter logging technique is most common on the coast of British Columbia. A suitable water drop zone should reflect the following attributes:

- The drop zone area must be large enough to allow for the storage of large quantities of logs before processing (immediately following drop by the helicopter);
- Area must be large enough to allow boom boats to collect chokers and complete a rough initial sort of logs (by species or other features such as log length);
- The drop zone area must be located in calm protected water;
- The drop zone must enable the collection and disposal of debris (limbs, bark, broken ends etc.); and
- The area may be required to accommodate a processing barge or float.

3.0 HELI-LOG – WATER-DROP REGION: COAST & INTERIOR

3.1 Geographic Range

- Water drop technique is little used in the interior of British Columbia.
- Used extensively throughout the coastal region including South Coast (including Vancouver Island), Mid-Coast, North Coast and Queen Charlotte Islands / Haida Gwaii.

3.2 Resource Requirements

Site Selection:

- Land requirement ranges from as small as 2-3 hectares to an area as large as 15- 20 hectares depending on log storage requirements and the extent of sorting activity.
- Drop zones are usually within 2 kilometres horizontal flight distance of the cut blocks, water depth is a minimum of 10 meters and the zone is relatively protected from prevailing winds and heavy seas.
- Each site must be compatible with overall water borne log processing / bundling operations.
- Adjacent foreshore area is required to anchor boom-sticks (log pen).

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3.3 Products

- Fully, or partially processed logs. Logs are bagged, by species and/or end use (e.g. pole log lengths) in preparation for bundling or barging and downstream (further) sorting or final processing.
- Both export and domestic log buyers may inspect logs at the drop zone / processing barge so as to negotiate purchase terms or to ensure quality control.

3.4 Investment

- Investment in equipment ranges from $2.0 - $3.5 million depending on the configuration of log processing equipment (load log and debris tractor), boom boats, debris skiff(s), choker float and processing barge.

3.5 Infrastructure

- Log towing and log barging services – transport of bagged logs to storage grounds.
- Fuel and supplies (wire rope) transportation.
- Debris control, depending on availability this is usually contracted to local First Nations.

3.6 Market Outlets

- Primarily domestic (BC-based) log buyers and log processors (sawmills, pulp mills etc.)
- Offshore custom log buyers (log export) – up to 35% of the harvest on the North Coast may be exported.

3.7 Resource Capacity

- Selection of drop zones is determined by the location of timber opportunity and flight path characteristics. Virtually all deep water locations in reasonably protected waters and proximate to an economic timber opportunity are candidate drop sites.

3.8 Labour Markets Employment

- Water drop zone with log processing – 5 to 6 fulltime equivalent jobs.
- Drop zone only 2-3 full time jobs.

3.9 Government Revenues

- Annual rental fees – range from temporary permit ($250) to licence of occupation ($500).
- Property taxes (municipal) – not applicable.
- Contribution to stumpage revenue ~ $2-4/$m^3$ to stumpage revenues depending on log values.

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3.10 Regulatory Regime(s)

- Forest Practices Code Section 6.2.12 Riparian Management & Timber Harvesting Practice Regulation 11(3).
- Forest Practices Code – Division 4, Cut-blocks, Section 20(b)(iii).
- *Navigable Waters Protection Act*.
- *Fisheries Act* – primarily sections 35 to 43, Fish Habitat Protection and Pollution Prevention.

3.11 Coefficient Area of Crown land

- Water-based heli-drop and (some) log processing adds $6/m^3$.
- Area use coefficient estimated at $50,000 / hectare /drop zone (average economic use of drop zone estimated at 25,000 m^3).

4.0 LAND DROP

Aerial yarding, by way of a heavy-lift helicopter typically employs a land drop technique where no coastal or inland water ways are located within 2 kilometers of harvesting site (cut block). The considerations which must be factored into the design and construction of an efficient, safe dry-land heli-log drop zone are:

- To what extent are logs to be manufactured / processed immediately after arrival at the (dry-land) drop zone;
- The volume of timber to be processed over an hour or shift will determine the number of pieces of equipment (log loaders and trucks) at the drop zone;
- The extent to which logs must be temporarily stored at the drop zone;
- Approach and departure flight paths to the drop zone – extensive tree felling may have to be conducted adjacent to the drop zone to ensure safe flight paths;
- Availability of water supply to wet down drop zone and control dust[1]; and
- Logging slash accumulation and disposal strategies.

[1] Rotor wash creates can generate significant dust which hampers ground operations and results in increased aircraft maintenance.

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5.0 HELI-LOG – LAND-DROP REGION: COAST & INTERIOR

5.1 Geographic Range

- Province wide application where terrain conditions restrict conventional ground-based yarding / skidding and timber values offset increased costs of aerial yarding.
- Most common on coast and East and West Kootenay regions of British Columbia.

5.2 Resource Requirements

- May be a mix of Crown and private land or entirely Crown / private industrial land – most often Crown land only.
- Land requirement ranges from as small as 3 hectares to as much as 10 hectares depending on log storage requirements, the extent of sorting activity and construction costs.

5.3 Products

- Fully or partially processed logs for sale to be sold to other (other than operator / licensee) log buyers, or for internal use in "own" timber processing facilities.

5.4 Investment

- Drop zone only, equipment includes log loaders and tractor for debris.
- Up to $1.5 million depending on the mix of contract and operator-owned equipment.

5.5 Infrastructure

- Access to skilled labour in the form of capable contractors is usually key to operations. Several contract heli-log operators provide full ground services (drop zone) although most provide the aerial yarding only – other contractors / support firms provide ground based support including:
  - Log processing – loader and bucking personnel.
  - Log hauling – typically on a contract basis.
  - Fuel, crew and supplies transportation.
  - Road / landing maintenance (contractors).
  - Equipment maintenance – gear, tires, hydraulics etc.
  - Waste transport (depending on the extent of debris).

5.6 Market Outlets

- Domestic (BC-based) log buyers and log processors (sawmills, pulp mills etc.).
- Offshore custom log buyers (log export).

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5.7 Capacity

- Increasingly, harvesting in watersheds and areas of steep terrain throughout the coast and interior is by helicopter. Difficult to estimate the capacity of the timber harvesting land base to support land-based drop zones.
- Minimum volume by which to amortize cost of construction of drop zone is in the range of 10,000 m^3 depending on site-specific characteristics.

5.8 Labour Markets Employment

- 8 – 10 fulltime personnel, depending on volume delivered to the landing site per hour or per shift.
- Short turn cycle will increase volume delivered to the drop zone thereby requiring additional log handling equipment (log loaders and trucks). Log handling is typically on a contract basis.

5.9 Government Revenue

- Annual rental fees –range from temporary permit ($250) to licence of occupation ($500).
- Property taxes (municipal) – not usually applicable.
- Contribution to stumpage revenues ~$2-4/$m^3$.

5.10 Regulatory Regime(s)

- Forest Practices Code Section 6.2.12 Riparian Management & Timber Harvesting Practice Regulation 11(3).
- Forest Practices Code – Division 4, Cut-blocks, Section 20(b)(iii).

5.11 Coefficient Area of Crown Land

- Land-based heli-log drop and limited log processing adds 4/m^3.
- Land use coefficient estimated at $ 35,000 / hectare /drop zone. (average economic use of drop zone estimated at 25,000 m^3).

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6.0 GOVERNMENT REVENUES

6.1 Rental Fees

Land & Water British Columbia Incorporated (previously British Columbia Assets and Land Corporation) advises the use of Crown lands, both foreshore and upland parcels, is facilitated through one or a combination of agreements, either a temporary permit, licence of occupation or lease, applicable to Crown land uses including heli-log drop zones, dry land and water log sorts and log storage on both foreshore and upland parcels of Crown land:

	General Description	Fees
1. Permits		
Best suited to heli-log drop zones.	➤ Issued for use of Crown land for less than one year.	$250 per permit.
2. Licence of Occupation		
Best suited to short to medium term use (renewed annually) and water log sorts.	➤ Range in size from 0.2 hectares up to 20 hectares. One licence may include several related sites – this is typically the case for heli-log drop zones. Normal term is 10 years.	Minimum fee is $500/year – annual fees are calculated at a rate of 7.5% of the licence value.
3. Lease		
Best suited to the longer-term use of Crown land for the purpose of sorting on dry land.	➤ Normal term is 30 years. ➤ Site must be surveyed and designated for exclusive use by lessee. Term of lease may be as long as ten years.	Rental for a lease is calculated at 8% of the lease value. Minimum annual rental is $500.

An excerpt from the Crown Land, Land Management Manual, Volume 3, Chapter 3.3 is attached, this section of the manual describes the forms of land use tenures and pricing applicable to the use of Crown land for log sorting and log storage. **Appendix I** of this section of the Land Management Manual describes a fee schedule for log handling including heli-log water drop and storage.

7.0 INPUT / OUTPUT ESTIMATES FOR HELI-LOG DROP ZONES

The Ministry of Forests' has prepared and maintains two manuals, the *Coast Appraisal Manual* and the *Interior Appraisal Manual*, both of which are approved by the Minister of Forests, which together contain the policies and procedures for determining stumpage rates charged for Crown timber harvested in British Columbia.

Both the Coast Appraisal Manual and the Interior Appraisal Manual identify phase cost estimates which under the Comparative Value Pricing System are estimate harvesting and

transportation costs which are applied to each cutting authority area for the purposes of calculating the applicable stumpage rate. The phase cost estimates, predictive formulas and several of the data / cost tables in each manual are derived from data collected through surveys of logging and forest management costs incurred by licensees and contractors.

7.1 Heli-log Drop Zones – Input / Output Estimate

The Ministry of Forests has derived the cost estimates for timber harvesting and transportation on an aggregate basis. The helicopter logging cost estimate in the Coast Appraisal Manual has been developed on a tree-to-truck basis which results in a predictive formula which aggregates the costs of the following phases of helicopter logging:

- Falling and bucking
- Aerial yarding of timber
- Loading log trucks
- Landing construction
- Choker chasing (removal and return to cut-block)
- Rent/lease or depreciation of a barge
- Bag log booming
- Towing of bagged booms to a local tie-up or sort area
- Crew transportation
- Camp mobilization / demobilization.

The resulting prescriptive formula for a tree-to-truck heli-log appraisal (cost) estimate is:

$/m^3 = 68.610 +3.73(D) +0.0337 (Hembal %)

where:

D = one-way average horizontal flight distance in km from the setting to the drop zone

Hemal % = % of hemlock and balsam species in the cutting authority

This prescriptive formula, for a tree-to-truck cost estimate does not allow for a "de-bundling" of the costs of the component phases or activities including the drop zone component of the heli-log operation. On the basis of a 1.5 kilometer flight distance and a Hemlock Balsam species composition of 50%, the tree-to-truck estimate would be $75.89/m^3. The yarding phase (aerial flight) represents the most significant component of this aggregate cost estimate.

We estimate inputs (costs) for the heli-log drop zone component to be in the range of $10/m^3 and $12/m^3 for water and land drop respectively – this in the range of 13 – 15% of the aggregate tree-to-truck estimate.

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7.2 Input / Output Coefficients

An important descriptive characteristic of each building block is the economic outputs generated by each unit of Crown resource utilized as an input to the building block. The area of Crown land or foreshore and water area consumed to support the activity is the (standardized) input unit.

Contributing industry operators were able to estimate the physical area requirement associated with heli-log water and land drop techniques. However, the most efficient measurement for capturing the economic outcomes associated with heli-logging operations is $/m^3$. The table below translates the operational measurement, expressed as $/m^3$, into an area-based expression.

Land-Area Coefficient Estimates

Building Block or Economic Activity	Contribution of the BB to End Value of Products $/m^3	Coefficient Per hectare of Crown Land
Heli-log Drop Zones		
➤ *Water Drop*	Drop and log processing adds $6/m^3	**$50,000 / hectare/drop zone** *
➤ *Land Drop*	Drop and limited log processing adds 4/m³	**$ 35,000 / hectare /drop zone** *
		* estimate economic life of drop zone is 25,000 m³

7.3 Regulatory Requirements

The planning and use of helicopter logging drop zones is regulated primarily by the *Forest Practices Code of B.C. Act* and the Timber Harvesting Practices Regulation as follows:

Forest Practices Code Section 6.2.12 Riparian Management and Timber Harvesting Practice Regulation 11(3).

- A person carrying out helicopter, balloon or another type of harvesting must not use as a log drop area
- The littoral zone of a marine or fresh water system
- Water that is less than 10 meters deep, or a marine-sensitive zone.

Forest Practices Code – Division 4, Cutblocks, Section 20(b)(iii)

- The plan describes for the cutblock the location any area of water that will be used as a helicopter or balloon drop area.

The relevant excerpts of each regulation are attached.

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Heli-log waterdrop operations, under the three forms of provincial land use tenures available for log handling (temporary permit, licence of occupation and lease), are also regulated by two federal statutes:

1. Navigable Waters Protection Act

The main purpose behind the *Navigable Waters Protection Act* is to ensure public access to and efficient use of public waterways in Canada. Water borne log handling, including heli-log drop, log sorting, log storage and transportation (bagging, booming and barging) must be conducted in a fashion which does not result in the creation of navigable water hazards.

2. Fisheries Act

Primarily sections 35 to 43 of the *Fisheries Act*, Fish Habitat Protection and Pollution Prevention, are those sections of the Act which impact on log handlers. Water borne log handling must be conducted in a manner so as not to degrade either water quality of fish habitat. This section of the *Fisheries Act* would be applicable to all water borne log-handling activities including heli-log drop.

Companies and Agencies Who Contributed Data to this Study:

- Coulson Forest Products, Port Alberni, British Columbia.
- Terminal Forest Products, Richmond, British Columbia.
- Ministry of Forests, Victoria British Columbia.
- Land & Water British Columbia Incorporated, Nanaimo, British Columbia.

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ATTACHMENT 1

Crown Land, Land Use Management Manual
Volume 3, Chapter 3.3

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ATTACHMENT 2

Excerpts of Applicable Regulations

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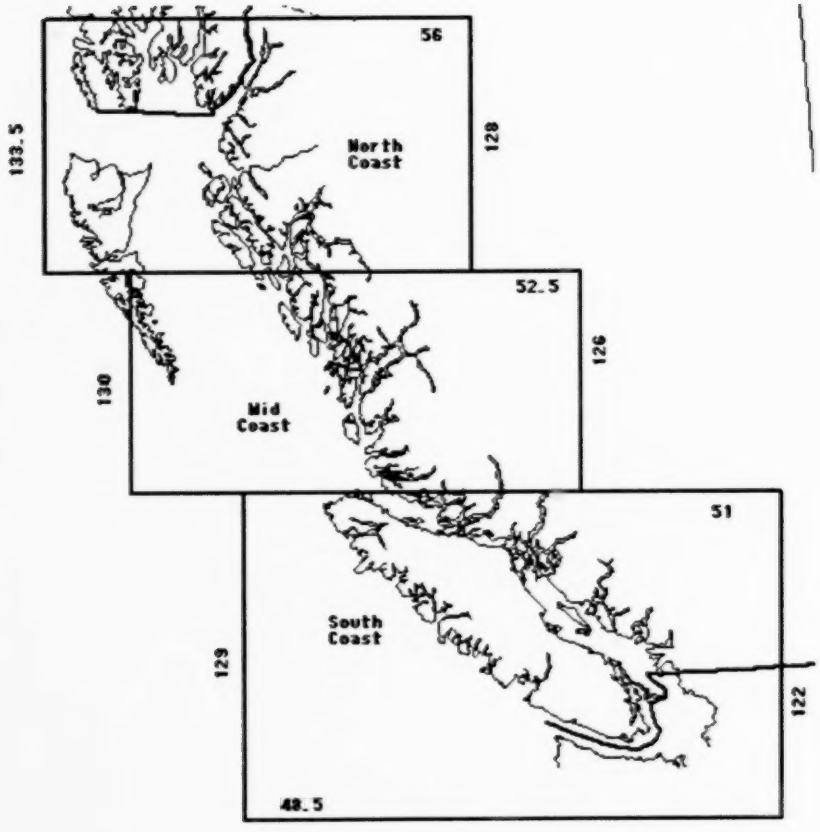

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ATTACHMENT 3

Example of a Log Sorting Offence under the *Fisheries Act*

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